**Supplementary material 1**

The LA and MC-ICPMS parameters and the typical cup configuration are given below (Gehrels *et al*. 2008; Chang *et al*. 2006).

**Optimized Instrumental parameters**

|  |  |
| --- | --- |
| Laser Ablation system | Description/optimized value |
| Make | Photon Machine |
| Model | Analyte G2 |
| Type | Excimer |
| Wavelength | 193 nm |
| Repetition rate | 5 Hz |
| Energy density | 4 J cm-2 |
| Spot size | 15-35 µm |
| MFC1 | 0.6 l/min |
| MFC2  MFC3(N2) | 0.4 l/min  5 ml/min |
| Shot count | 175 |

|  |  |
| --- | --- |
| MC-ICPMS | Description/optimized value |
| Make | Thermo Fisher Scientific |
| Model | Neptune Plus |
| Cool Gas | 16 l/min |
| Auxiliary Gas | ~0.7 l/min |
| Sample Gas | ~0.931 l/min |
| RF Power | 1350 watts |
| Guard Electrode | Off |
|  |  |
| Detector Mode  Integration Time | Faraday+ICs  0.5 s |
| Scan Mode | Static |

Cup Configuration

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Masses measured | Detector:  Mass: | IC5  202Hg | IC4  204Pb+204Hg | IC2  206Pb | IC1B  207Pb | IC6  208Pb | H3  232Th | H4  238U |